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POLICY UNDER THE PURNELL ACT

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Report of the Committee on Experiment Station Organization and Policy, presented at the Chicago Meeting of the Association of Land-Grant Colleges, November 17, 1925. Distributed at the request of the Experiment Station Subsection.

The Purnell Act has brought new responsibilities and obligations which deserve attention at this time. In many ways it marks a new epoch in the history of the stations and of agricultural investigation in this country. It authorizes an amount of money for research in a single field unparalleled in the annals of science; hence it properly will arouse large expectations and be the subject of critical attention far beyond the field of agriculture.

It is important that the Purnell Act shall mean more than additional funds and an enlarged field. It should mean an enlargement of ideals and a general strengthening of the stations to meet the new situation. It ought to be characterized by better unified programs, a closer knit organization, standards of work which, while meeting the needs of practice, will conform to those of scientific research in all cases, and qualifications for workers in every department which will stimulate thorough training and steady growth. It should mean taking full advantage of the experience of the past, not only as to the point that has been reached in investigation, but also as to the type of administration which will make for the most effective and productive use of the combined resources. Since all of the stations are involved and their interests are reciprocal, the defining of certain general principles to guide at this stage will be helpful.

Purpose of the Purnell Act.

The Purnell Act, it will be remembered, is for "the more complete endowment and maintenance of agricultural experiment stations now established." It is to build upon what the States and the Federal Government have already provided. It is the third subsidy for this great national system.

It is important to recognize that this new fund is not to relieve the State of present obligations, financial or otherwise. This was emphasized at all the hearings and conferences held upon the measure. Although the maintenance of experiment stations is not a 50-50 proposition, in effect it has always been a cooperative enterprise between the Federal Government and the States. The Hatch Act, which supplied the initiative for the national system, did not undertake to carry the whole burden. It was designed, as the opening sentence stated, "to aid" in attaining the objects sought in the establishment of these institutions. In advocating this latest legislation much emphasis was laid on what the States are now doing, and on the fact that it was not designed to relieve them but rather to stimulate and further extend their efforts.

Hence, the policy should be to continue present local support on at least the present plane, in order that the States may sustain their obligations. To do otherwise would be not to keep faith with Congress and to lay the institutions open to serious criticism. State funds will be needed to supplement the Purnell fund and to take care of expenses of a general nature. Each State already has an experiment station with its organization, its administrative machinery, and in large measure the buildings, lands, and other basic facilities for research; and the Purnell Act attempts to build on top of what already exists, its primary purpose being to develop further investigation and experiment. Hence, it should be the plan that overhead expenses will be cut to the lowest feasible limit, and that the use of this new fund be restricted, as the Act prescribes, "to paying the necessary expenses of conducting investigations or making experiments...and for printing and disseminating the results of said researches."

Type of Investigation.

While the terms "experiment," "investigation," and "research" are subject

to interpretation, everything indicates that a high type of work was in mind, to get new and better established facts and to mark progress. The representative of this Association who drafted the measure under its instructions emphasized the fact that "the authors of this bill have in mind fundamental scientific research." The President's Agricultural Conference endorsed the measure as one for "the fact-finding agencies for agriculture," and the Secretary of Agriculture has referred to it as a "fact-finding, fact-interpreting measure."

Unquestionably, therefore, the Purnell fund ought to stand for sound investigation, in accordance with modern conceptions of that term. In the older fields of production, elementary work dealing merely with comparisons on a financial basis, or with simple tests as ends in themselves, or with purely empirical facts regardless of their scientific value and relationships, ought to be discouraged. Such work belongs to an earlier and more primitive stage of experimentation. It was not for that kind of activity that appeal for increased funds was made. It is clear that investigation under this new fund should express progress in the concept of the problem, as well as in the point at which the new work begins.

The three fields of work so prominently emphasized in the campaign for the new Act, namely, agricultural economics, home economics, and rural sociology, are relatively new lines of research, which have been but little developed at the stations in the past, and deserve special study. As research subjects, they are not fully formulated as to ways and means. In some cases there is little more than a general view of the field and the need for an ill-defined type of research to bring about improvement. In entering these fields the stations again have before them the task of analyzing conditions and determining practical means of attack that will gradually bring beneficial results.

While in these fields there is more excuse for elementary work to uncover economic facts and social conditions, the effort should nevertheless be to see to it that the work is properly aimed, that it attempts to ascertain facts of breadth

and permanence, and that it proceeds by a plan and method which are adequate to the subject and in accord with the method of science.

Much reliance at the outset is being placed on surveys, questionnaires, and the gathering of statistics. These often will be necessary to ascertain what the condition actually is, but the cataloguing of conditions or the taking of a census ought not itself to be an object but only a step in the plan for real research. Questionnaires and surveys may furnish a starting-point for more definite inquiry, the gathering of data for use and interpretation in research, rather than as final ends. There is sometimes an implied expectation that they can take the place of definite controlled experiments in determining questions of practical procedure or describing social conditions for which there is no statistical measure. It will be important, therefore, to make a distinction between the collection of statistics concerning agricultural conditions and rural people, on the one hand, and the accumulation and interpretation of statistical data to be used in connection with specific problems; and to recognize the limitations of these methods. Station investigation by advocating short-cut methods. The aim in productive research should be not only to get at the facts, physical and economic, but to determine what are their causes or relationships, what they mean in a broad sense, and what their study suggests for improvement.

Character of Projects.

In the past there have been many projects of very broad range and indefinite aim. They have dealt with fields of work rather than with definite subjects. At the present stage the framing of concrete investigations of such limited range as to make them feasible of accomplishment seems most promising. There ought to be thoughtfully considered and matured outlines, subjected to scrutiny and criticism before they have passed the director's office. For work to be constructive at this stage it must recognize the status of investigation as a basis for the new steps;

it needs to be a concrete proposal, resting on what is known, directed at something important to be known and by means that are adequate.

This is an important administrative provision. Without definiteness of purpose there is no other way of judging a new investigation as to its originality or novelty, or the individuality to be expressed in it. Risk as to the outcome of an investigation is in its very nature, but new work should be undertaken in justifiable faith.

Concentration of Effort

The fact that before the coming of the Purnell Act the stations were carrying on their active lists considerably over 5,000 separate projects--more than a hundred to a State on the average--indicates how widely their interests and resources were dispersed. The present may well be a time for taking account of stock, for realignment, and especially for applying the new funds to a more systematic and less heterogeneous program. The tendency to scatter over an unduly broad field is to be guarded against. The stations have suffered in the past from having more projects than they could support. A recurrence of this condition under the new funds is easily possible. The great need is for intensive work in the sense that it deals only with such a number of things as can be given thorough study. The stations have had to do considerable more or less superficial work in the past. This is recognized as not being the most profitable or satisfactory kind of work in the long run. It seems highly important, therefore, at this stage, to plan to concentrate on activities sufficiently limited in number so that they can be carried out in thorough accord with the best spirit and method of science. The policy should be to make a wise selection of things to be attacked, and to do these things well.

To that end investigators should be encouraged, and if necessary constrained,

to concentrate their efforts on a few things, and to put enough effort into such projects to make them as highly constructive as possible. They should represent the best there is in the persons charged with them when given favorable conditions for their prosecution.

Trained Workers Needed.

Emphasis should of course be laid on trained workers who are still in the growing period of their career. Such persons ought to possess initiative and be able to put individuality and originality of ideas into their work, as well as to be ready to act on new ideas. It is a reasonable expectation that they will be able so to carry on their investigations that they can form a critical judgment from the results.

The development of adequate forces to occupy the enlarged field of the stations is an important feature, which to some extent must wait on time. But it is fundamental that the proper standards of requirement be recognized and set up, and the conditions made such as to encourage training to meet these standards. There needs to be a better appreciation of the exceptional character of ability essential to productive research, expressed in the salary, the rank, and the outlook. There should be no question that ability in research will be rewarded and that rank and salary are attainable in that field as well as in administrative positions. Workers of proven ability deserve to be utilized to the fullest advantage, and a less variety of service should be required from them so that they may give their time more consecutively to investigation. The experiment station is now entitled to be regarded as a primary feature of the institution, not only in theory but in the provision for its working staff.

The Problem the Unit of Effort.

In organizing new lines of work and fitting them into the existing investigations on production, it is important to remember that the problem is the natural

unit of organizing such inquiries. While appreciating the importance of developing research which will fully recognize the new branches, the error should not be made of emphasizing the department and its independence to the disadvantage of the problem. The relationships and ramifications of a project beyond the department originating it often will need to be taken into account.

Agricultural investigation is made up of problems. The several departments of a station are agencies for analyzing and solving such problems. The station is more than an aggregation of departments; it is an organization, and its complexity grows out of the fact that the problems it is designed to solve are complex and need the outlook and the technique of various divisions of science. More and more it is becoming evident that these agencies can with great advantage be led to center their investigations on subjects of common interest, the solution of which require joint or coordinated effort.

Cooperation.

Secretary Jardine significantly remarked at the St. Louis Conference that "Cooperation is good for research people as well as for farmers....There must be a spirit of give and take between research people, and due recognition of contributions made by the cooperating parties. These funds were made available for the specific purpose of aiding agriculture, and we must not permit selfish personal considerations or petty jealousies in any way to jeopardize the results of our work." He declared that:

"It is a reasonable expectation that the Purnell Act will lead to a considerable enlargement of the cooperative relations between stations and with the various bureaus of the Department. This seems important at the present juncture. It is in line with the idea of organizing investigation around problems instead of around a single station department. Very many of the problems we now face are too large for individual States acting separately. They are regional or even national,

and there is danger of viewing them too narrowly. An experiment station working single-handed can rarely expect to reach conclusive and comprehensive results in such broad subjects. It is important for both the institution and the investigator in many cases to detach themselves sufficiently from the local aspects of a question to view it impartially in its relation to the underlying problem and to what others are doing about it. It is usually easier to do this when a project is being set up than after work on it has become individualized.

"In these newer fields, then, there is a large place for cooperative effort; but this should be organized on a strictly cooperative basis. It should be arranged and carried out in accordance with carefully considered and matured plans, under which both the individual stations and the appropriate branches of the Department will limit their endeavors to comparatively few well chosen projects, into which they can put their best qualified workers and sufficient money to give reasonable assurance of useful results."

The avowed desire of the Secretary of Agriculture to bring the work of his Department and of the state experiment stations into closer union and coordination, and to promote cooperation in the fullest and best sense, deserves to be met in the sincere spirit in which it was offered. Furthermore, greater coordination of the work of stations among themselves, so as to avoid unnecessary duplication and give to such repetition as is warranted the nature of replication, is one of the ends to be continually striven for.

The Function of Administration.

These considerations make it manifest that administration will be a primary factor in insuring the larger success of the stations under the new Act. The idea that administration has only a minor part to play in a research institution is not borne out by the experience of the past twenty-five years. The service which it may perform is especially evident in case of research which is industrial and institu-

tional, as distinguished from that which is academic and individual. Its function is manifestly a delicate one, and deserves to be exercised not only with intelligence about research but with sympathetic regard for the position of investigators.

In view of the period of expansion the stations are now entering upon, administration is needed to fit the new features into the station program so as to make a properly balanced and correlated whole. It should be aggressive, discriminating, and stimulating. It will have far more problems to deal with than formerly. It will not suffice, therefore, for it to be casual, intermittent, or incidental; it will call for continuous attention and for a large measure of freedom from engrossing duties.

The following are some of the services the director may discharge in this new era of development, while leaving to the experts on his staff all proper freedom and initiative:

First, he can work out a program for the lines of research to be fostered, especially those to be featured. At this stage it ought not to be indiscriminate but may be expected to be a studied program, based on selection after advice from competent sources has been weighed. It ought to have reference not merely to the present, but should be ^a forward-looking plan. Proper balance will usually need to be maintained between projects which promise some rather immediate returns of practical interest, and those of long-time, fundamental character. Similarly, proper balance may be established between research in the economic field and that having to do with production.

Naturally it will fall to the director to bring together a staff of workers competent to carry out the lines of work selected. He will be responsible in the first instance for the grade of qualifications set up and the selection of persons who meet the requirements. His staff is his means of executing his program. He may render an important service by seeing to it that favorable conditions for research

are provided and that the maximum opportunity is preserved for it. He ought to be able to detect the advantages and disadvantages of other duties in individual cases and their effect on the progress of the investigations. By knowing his investigators he can determine the kind of assistance likely to be helpful to them, where stimulation is needed, and the importance of encouraging advanced study.

The director will need to maintain close, sympathetic contact with each project as to its progress and productiveness and to encourage the recording of results in manuscript form frequently enough to prevent loss through changes in staff members. From an organization standpoint it is desirable for the director to deal quite directly with project leaders, even though they may not be the ranking heads of large departments. After the preliminaries have been arranged formalities ought not to stand in the way of his direct contact with all branches of the station work.

It devolves especially upon the director to encourage and develop the collective thinking, joint action, and team work so essential to a large proportion of our research. He must view undertakings in the large, in order that they may be so organized as to cover the subjects symmetrically and to attain their objectives. The spirit of cooperation and coordination will need to be encouraged, as well as the idea of organization on the basis of subjects of investigation. The development within the staff of a spirit of good will and community of interest will rest in no small measure on the director. It will not be sufficient to accept cooperation as a policy, but the means of working it out in specific cases and of keeping it moving effectively often will require detailed attention.

The publication of the results of station work, choosing the proper channels and reserving funds therefor, will be a helpful service of the director's office. Effective publicity deserves more attention than is sometimes given to it. Significant results ought to be published promptly, and a disposition to accumulate results

The first part of the paper is devoted to a general discussion of the problem.

In the second part, we shall consider the case of a single particle.

The third part is devoted to the case of a system of particles.

In the fourth part, we shall discuss the results of our calculations.

The fifth part is devoted to a discussion of the experimental results.

In the sixth part, we shall consider the case of a system of particles.

The seventh part is devoted to a discussion of the results of our calculations.

In the eighth part, we shall consider the case of a system of particles.

The ninth part is devoted to a discussion of the results of our calculations.

In the tenth part, we shall consider the case of a system of particles.

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The twenty-fifth part is devoted to a discussion of the results of our calculations.

over long periods without summarizing them may need to be curbed. It will be for the director to see that close contacts are maintained with the Extension Service so that the results of research may be fully capitalized in practice.

From his position, the station director has an important relation to research in the entire institution. He represents the largest organized body of it, and he can help to develop a research spirit which will promote investigation throughout the institution.

Finally, it will rest largely with the director to see that contact is maintained between the station and the public. Means need to be established and kept open for bringing the station's work prominently to the attention of those it is designed to help, in order to popularize it and to maintain a proper realization of its fundamental importance. There is danger that the loss of close contact the station formerly had may cause it to lose ground in public appreciation and understanding.

Summary.

To summarize, the following general principles are suggested for adoption as suggesting the basis of policy in the administration of the Purnell Act:

(1) This Act is supplementary to the two previous ones for experiment stations. It is to build upon what already has been provided. It is for a going concern, and it is not designed to relieve the States of their financial obligation. It is for new investigation or putting new force into work already under way.

(2) As it is supplementary and for increasing investigation, general overhead charges, except such as relate to the support of definite projects, are not considered warranted. The purpose the fund is serving will stand out more clearly if its admixture with other funds in the support of projects is held down to

the minimum. To scatter it unduly and in small amounts over projects supported mainly from other funds will increase the task of administration and may suggest that it is being dissipated.

(3) The Purnell Act is designed to promote sound investigation in accordance with modern conceptions of that term and the present status of knowledge. Progress at this stage calls for clear-cut, concrete proposals. This implies analysis of complex problems and the study of individual features by the most adequate means that research has disclosed, with the constant aim of strengthening methods and making inquiry more penetrating.

(4) Only a relatively small field in the several branches of a station can be covered at a given time. Hence the plan of concentrating on a few topics in each field and making the work comprehensive, thorough, and conclusive is highly important. Do a few things well rather than many things indifferently.

(5) A systematic, well-rounded research program promises more at this stage than a fortuitous, disconnected set of projects. It enables a more adequate attack on the selected topics and a better related whole.

(6) The problem is the natural unit in the organization of research on many-sided subjects. A relationship will thus be established between the research in production and that in economics, sociology, and the home, as a basis for "the establishment and maintenance of a permanent and efficient agricultural industry."

(7) The importance of cooperation and coordination within the stations, between stations, and with other agencies is recognized as now so definitely indicated as to make it a leading principle of administration. It is emphasized by the new fields of economics and rural life into which the stations are expanding. The breadth of many problems and their similarity in different sections favors joint effort in place of unrelated action. It is logical that the

Department of Agriculture and the experiment stations should work in close union, and every effort should be directed to that end.

(8) Effective research requires trained workers, with a sound background in science quite as much as in their specialties. The need for investigators with vision, initiative, and keen perception is imperative at the present stage. The securing of such qualifications will mean the maintaining of a high standard of requirements and making positions sufficiently attractive to warrant the necessary preparation.

(9) The experiment station is one of the primary features of the college. Responsibility for discharging its functions does not cease with its administrative officers but is reflected on the parent institution. Sympathetic recognition and support of the essentials for research, the type of workers required, and the adjustment of their duties are fundamental in meeting just expectations under the new Act.

(10) The administration of an experiment station has become a large and exacting matter. It has assumed an importance it has never had before. It calls for breadth of understanding and critical judgment in research, coupled with organizing ability and a familiarity with the leading problems of agriculture. With the present growth in prospect, effective direction will call for time to study the whole situation--the needs of the State, the proposals submitted, the organization of joint efforts, and the maintenance of contacts with the progress of the work. Upon wise administration will depend in the first instance the effective use of the large appropriations for agricultural research.

(Note: The above summary was approved by the Executive Body of the Association and therefore represents the policy of the Association.--E. W. A.)

